

Patent

Docket No. P24624 USA

What is claimed is:

1. A pencil sharpener comprising:

a first external shell having internal ribs defining a first plurality of support surfaces;

a sharpening sub-assembly for sharpening any pencil inserted therein;

5 a second external shell matable with said first external shell to define a substantially closed compartment, said second external shell having internal ribs defining a second plurality of support surfaces;

10 wherein said first and second pluralities of support surfaces cooperate with each other to engage and retain said sharpening sub-assembly in said component when said first and second external shells are mated.

2. The pencil sharpener of claim 1, wherein said first and second pluralities of support surfaces serve as the sole means of mounting said sharpening sub-assembly in said compartment.

3. The pencil sharpener of claim 1, wherein said sharpening sub-assembly comprises:

15 a blade-supporting shaft;

a rotary blade and a pinion carried co-axially on said shaft, said rotary blade having spiral cutting edges;

Patent

Docket No. P24624 USA

a blade holder defining a cavity for receiving an end of a pencil therein and supporting said shaft, said blade holder being supported by said first and second external shells to be rotatable around an axis of said cavity;

a cutter gear module defining a pencil-receiving opening and including an annular ring gear meshing with said pinion; and

a drive shaft which drives said blade holder around said axis; whereby said drive shaft is capable of driving said blade holder around said cavity, causing said pinion to travel along said annular ring gear and said rotary blade to rotate and sharpen any pencil advanced into said cavity.

4. The pencil sharpener of claim 3, wherein said blade holder defines a ring flange and said cutter gear module defines a ring groove for registering with said ring flange;

whereby said blade holder is rotatably supported at one end by said cutter gear module when said ring flange is positioned within said ring groove, said cutter gear module being supported by said first and second external shells.

5. The pencil sharpener of claim 4, further comprising:

an electric motor operatively connected to said sharpening sub-assembly for driving said sharpening sub-assembly, said first and second pluralities of support surfaces cooperating with each other to engage and retain said electric motor in response to mating of said first and second external shells, said first and second pluralities of support surfaces serving as the sole means of mounting said electric motor in said compartment.

Patent

Docket No. P24624 USA

6. The pencil sharpener of claim 3, wherein said cutter gear module comprises:
a switch operatively connected to said electric motor for driving said sharpening sub-assembly when said switch is activated by any pencil inserted into said pencil-receiving opening.

5 7. The pencil sharpener of claim 6, wherein said switch comprises a pawl and a pair of contacts mounted on said cutter gear module, said pawl being positioned to cause said pair of contacts to electronically connect for closing a circuit.

10 8. The pencil sharpener of claim 3, wherein said cutter gear module comprises:
a switch operatively connected to said electric motor for preventing operation of said motor unless said switch is activated by mating of a receptacle with said first and second external shells.

15 9. The pencil sharpener of claim 8, wherein said switch comprises a pawl and a pair of contacts mounted on said cutter gear module, said pawl being positioned to cause said pair of contacts to electronically connect for closing a circuit.

10. The pencil sharpener of claim 3, further comprising:
a dual switch operatively connected to said electric motor for driving said sharpening sub-assembly only when said dual switch is activated by a pencil inserted into said pencil-receiving opening and a receptacle mated with said first and second external shells.

Patent

Docket No. P24624 USA

11. The pencil sharpener of claim 10, wherein said dual switch comprises:
a first contact electrically connected to a first side of a circuit powering said electric motor;

a second contact electrically connected to a second side of said circuit;

5 a third contact mounted in spaced relationship to said first and second contacts;

a first pawl mounted on said cutter gear module in position to cause said third contact to electrically connect with said first contact responsive to insertion of a pencil into said pencil-receiving opening; and

10 a second pawl mounted on said cutter gear module in position to cause said third connect to electrically connect with said second contact responsive to mating of a receptacle with said first and second external shells.

12. The pencil sharpener of claim 11, further comprising a receptacle removably matable with said first and second external shells for receiving pencil shavings discharged from said sharpening sub-assembly.

15 13. The pencil sharpener of claim 12, wherein said receptacle comprises an internal fin positioned to contact said second pawl of said dual switch.

14. A pencil sharpener comprising:
a first external shell having internal ribs defining a first plurality of support surfaces;
a cutter assembly defining a ring flange and having a rotatable pinion;

Patent

Docket No. P24624 USA

a cutter gear module defining a pencil-receiving opening and including an annular ring gear meshing with said pinion, said gear module defining a ring groove for registering with said ring flange;

5 a second external shell matable with said first external shell to define a substantially closed compartment, said second external shell having internal ribs defining a second plurality of support surfaces;

whereby said cutter assembly is rotatably supported at one end by said gear module when said ring flange is positioned within said ring groove; and

10 wherein said first and second pluralities of support surfaces cooperate with each other to engage and retain said cutter assembly and said gear module in said compartment when said first and second external shells are mated.

15 15. The pencil sharpener of claim 14, wherein said first and second pluralities of support surfaces serve as the sole means of mounting said cutter assembly and said gear module in said compartment.

15 16. The pencil sharpener of claim 14, wherein said cutter assembly comprises:
a blade-supporting shaft;
a rotary blade carried co-axially on said shaft, said rotary blade having spiral cutting edges;

Patent

Docket No. P24624 USA

a blade holder defining a cavity for receiving an end of a pencil therein and supporting said shaft, said blade holder being supported by said first and second external shells to be rotatable around an axis of said cavity; and

a drive shaft which drives said blade holder around said axis;

5

wherein said pinion is carried co-axially on said shaft;

whereby said blade holder is rotatably supported at one end by said gear module when said ring flange is positioned within said ring groove, said gear module being supported by said first and second external shells; and

10

whereby said drive shaft is capable of driving said blade holder around said cavity, causing said pinion to travel along said annular ring gear and said rotary blade to rotate and sharpen any pencil advanced into said cavity.

17. The pencil sharpener of claim 16, further comprising:

a dual switch operatively connected to said electric motor for driving said sharpening sub-assembly only when said switch is activated by a pencil inserted into said pencil-receiving opening and a receptacle mated with said first and second external shells.

15

18. The pencil sharpener of claim 17, wherein said dual switch comprises:

a first contact electrically connected to a first side of said circuit powering said electric motor;

20

a second contact electrically connected to a second side of a said circuit;

a third contact mounted in spaced relationship to said first and second contacts;

Patent

Docket No. P24624 USA

a first pawl mounted on said cutter gear module in position to cause said third contact to electrically connect with said first contact responsive to insertion of a pencil into said pencil-receiving opening; and

a second pawl mounted on said cutter gear module in position to cause said third contact to electrically connect with said second contact responsive to mating of a receptacle with said first and second external shells.

19. The pencil sharpener of claim 18, further comprising:

an electric motor operatively connected to said cutter assembly for driving said cutter assembly, said first and second pluralities of support surfaces cooperating with each other to engage and retain said electric motor in said compartment when first and second external shells are mated, said first and second pluralities of support surfaces serving as the sole means of mounting said electric motor in place in said compartment; and

a receptacle removably matable with said first and second external shells for receiving pencil shavings discharged from said sharpening sub-assembly.

20. The pencil sharpener of claim 19, wherein said receptacle comprises an internal fin positioned to contact said second pawl of said dual switch.

21. A pencil sharpener comprising:

a first external shell having internal ribs defining a first plurality of support surfaces;

a cutter assembly defining a ring flange and having a rotatable pinion and rotatable

rotary blade;

Patent

Docket No. P24624 USA

a cutter gear module defining a pencil-receiving opening and including an annular ring cutter gear meshing with said pinion, said cutter gear module defining a ring groove for registering with said ring flange, said gear module comprising:

a first contact electrically connected to a first side of said circuit;

5 a second contact electrically connected to a second side of a circuit powering said electric motor;

a third contact mounted in spaced relationship to said first and second contacts;

10 a first pawl mounted on said cutter gear module in position to cause said third contact to electrically connect with said first contact responsive to insertion of a pencil into said pencil-receiving opening; and

a second pawl mounted on said cutter gear module in position to cause said third contact to electrically contact said second contact responsive to mating of a receptacle with said first and second external shells; and

15 a second external shell matable with said first external shell to define a substantially closed compartment, said second external shell having internal ribs defining a second plurality of support surfaces;

whereby said cutter assembly is rotatably supported at one end by said gear module when said ring flange is positioned within said ring groove; and

20 wherein said first and second pluralities of support surfaces cooperate with each other to engage and retain said cutter assembly and said gear module in said compartment when said first and second external shells are mated.